Southern Middle Patuxent River Watershed Assessment

COMMUNITY MEETING NO. 2

December 9, 2015

clean H2OWARD

Howard County Stormwater Solutions

Meeting Outline

- Welcome and Introductions
- Reasons for Study
- Watersheds 101
- Current Watershed Conditions
- Assessment Results
- Restoration Toolbox
- Countywide Implementation Strategy (CIS)
- Q&A – Information Stations

Why is the County doing a Watershed Assessment?

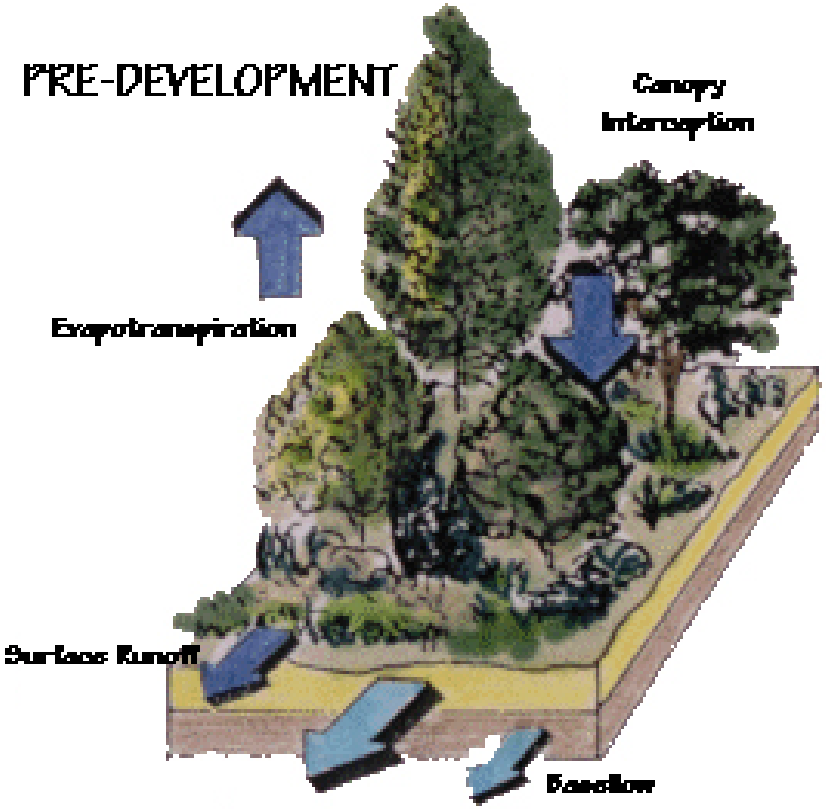
- Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) permit
  - Permit requires treatment of 20% of currently untreated impervious
  - Perform a comprehensive watershed assessment for the entire County within five year permit term
    - Little and Middle Patuxent Rivers in FY15 (Permit Year 1)
    - Patapsco and Mainstem Patuxent Rivers in FY16 (Permit Year 2)
  - Develop a Countywide restoration plan in Year 1 (CIS)
- Total Maximum Daily Load (TMDL) “pollutant diet” for nutrients
- **Looking for cost-effective opportunities for environmental restoration (List of projects)**

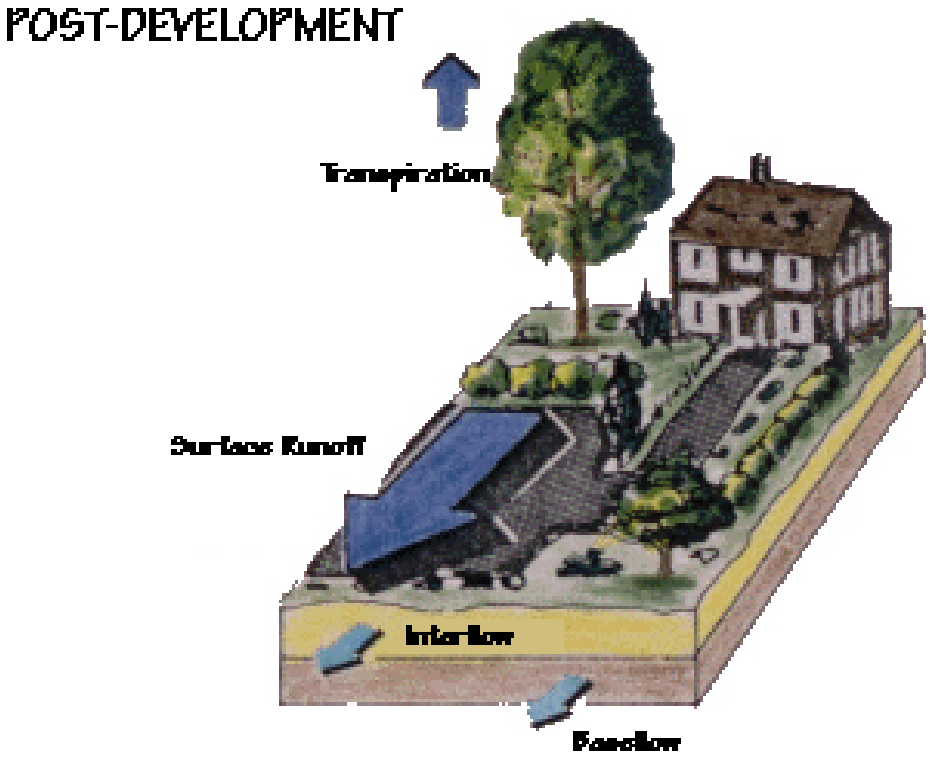
Chesapeake Bay TMDL

- Chesapeake Bay TMDL Sectors:
  - Agriculture
  - Forest
  - Septic
  - Wastewater
  - **Urban Stormwater**
- NPDES Permit Year 1 - Restoration Plans for All Existing TMDL Waste Load Allocations (Bay and Local)
- All Sectors – Reduce Phosphorus (P) by ~30% and Nitrogen (N) by ~40% (approx. half of total reduction is urban stormwater)
- Bay TMDL - Meet 60% by 2017 and 100% by 2025

Watersheds
101

WATER BALANCE

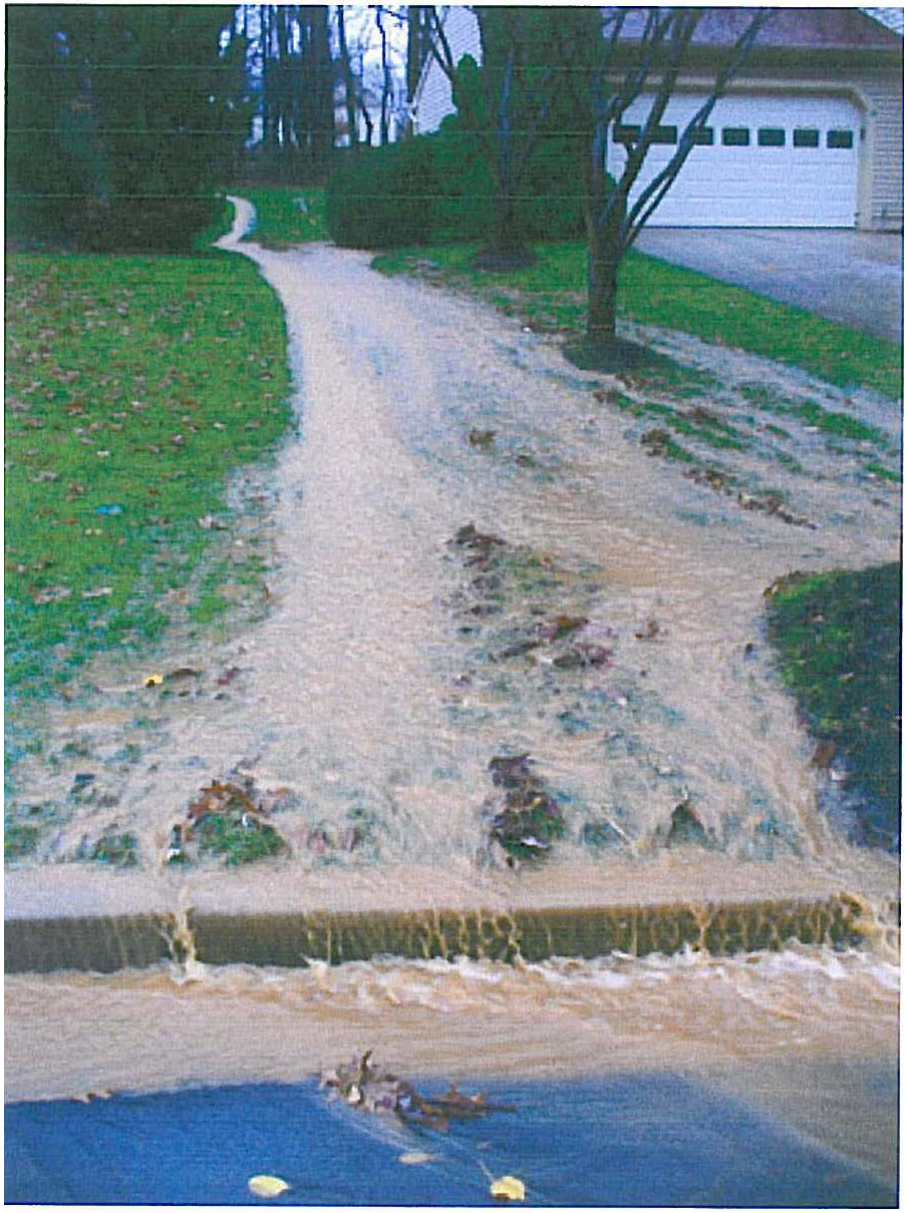


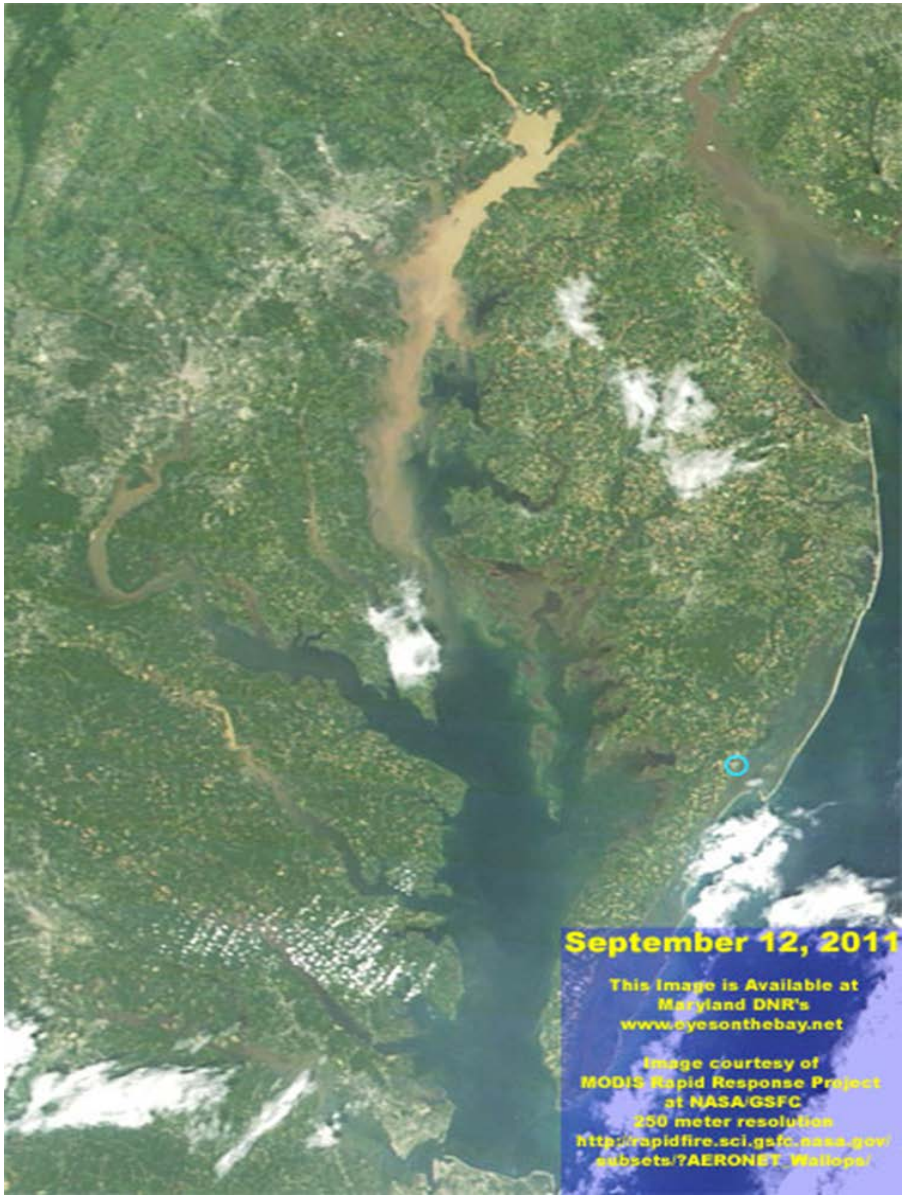


Where does storm water go?

A. To a wastewater treatment plant so pollutants and trash can be removed before the water goes to a nearby stream.
B. To a nearby stream without any treatment.
C. To a stormwater management facility for pollutant removal and then to a nearby stream.
D. B or C

The Problem




September 12, 2011
This Image is Available at
Maryland DNR's
www.eyesonthebay.net
Image courtesy of
MODIS Rapid Response Project
at NASA/GSFC
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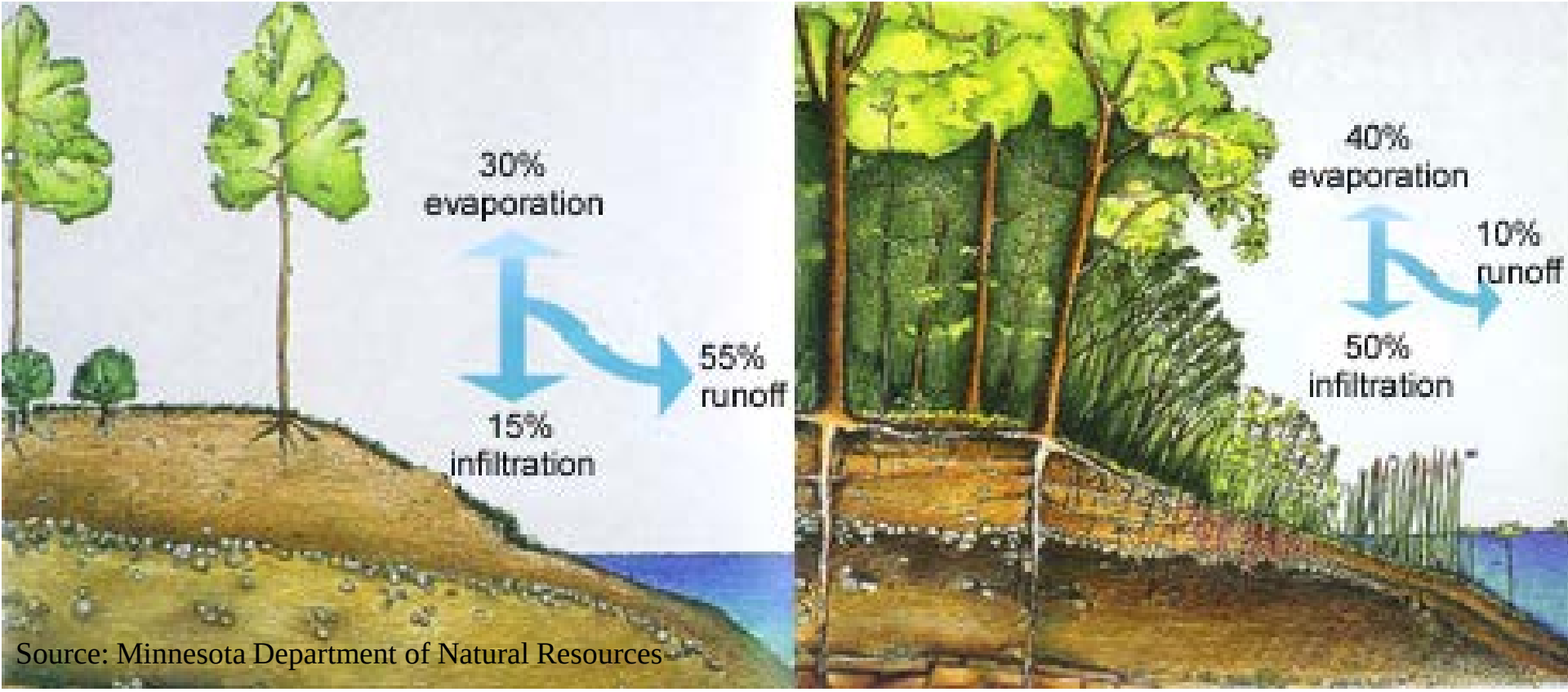
Impervious Cover

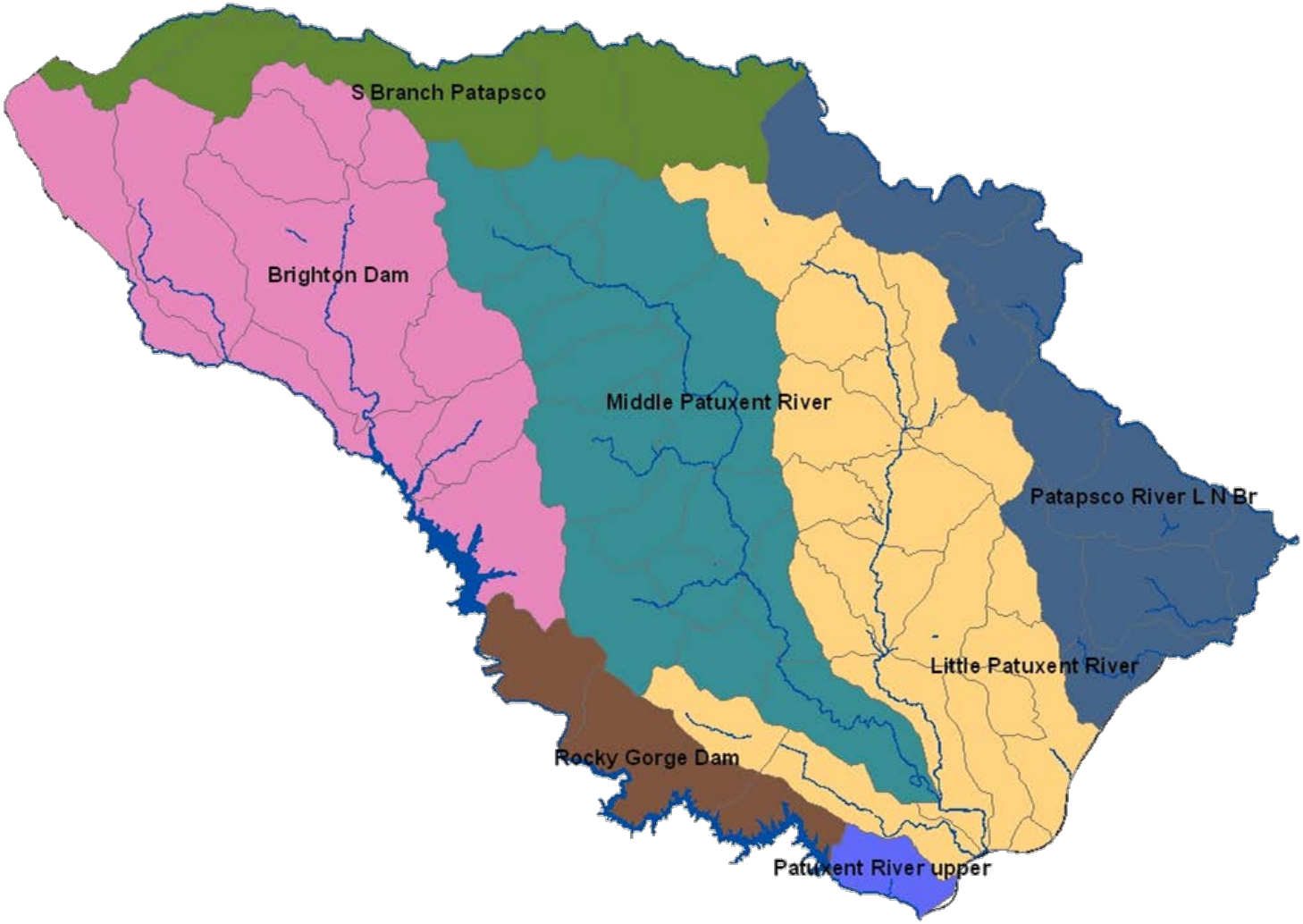
County = 13.6% Columbia ~ 15%-20%



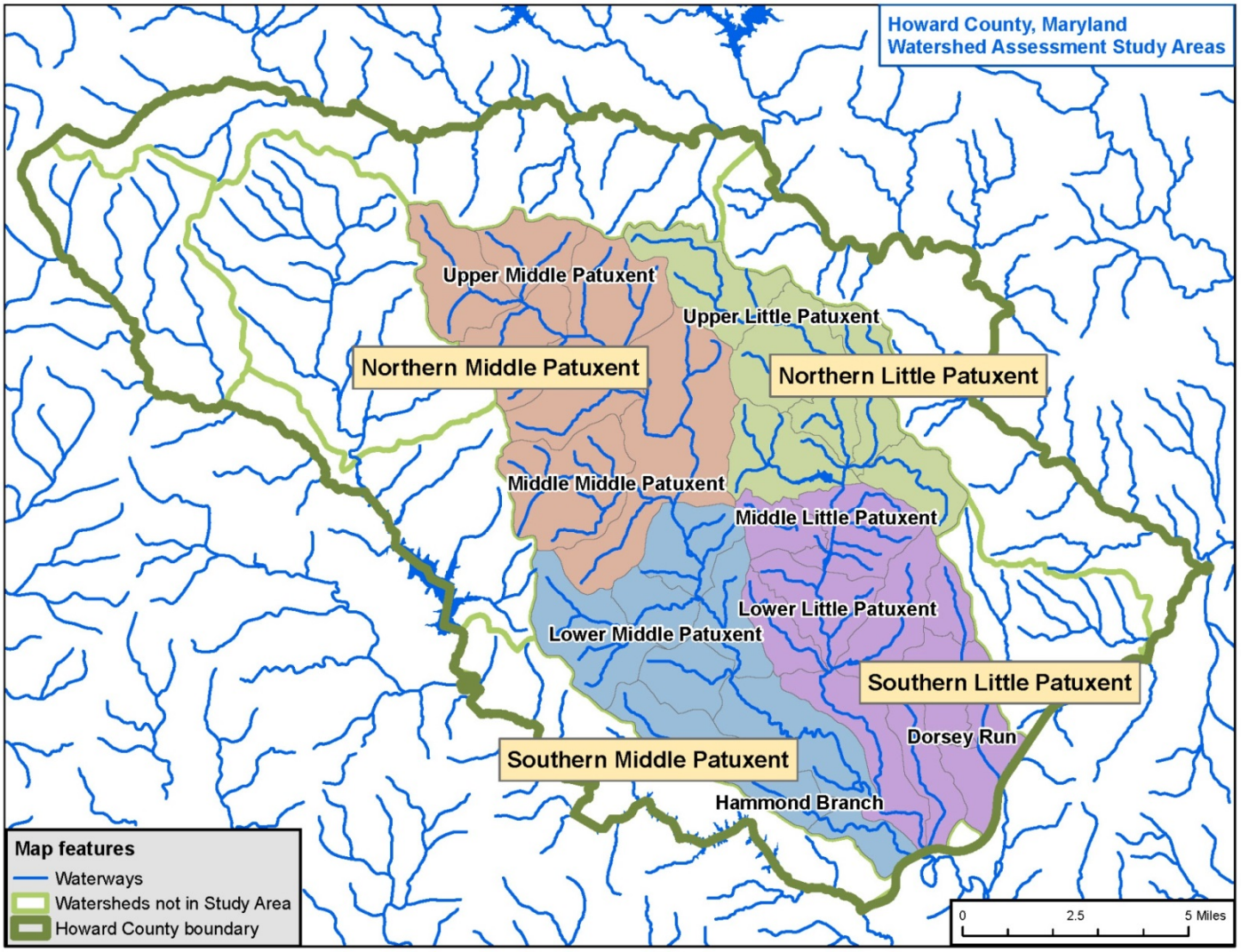
Source: Minnesota Department of Natural Resources

Water quickly runs off a shoreline cleared of natural vegetation, washing nutrients and pesticides into the water. A natural shoreline holds rainfall, which soaks into the soil; less water, soil and chemicals run into the lake or river. Shoreline and aquatic plants anchor shoreline areas, helping to protect them from erosion due to runoff and waves (Source:MN DNR)

County Watersheds



Breakdown of Study Areas

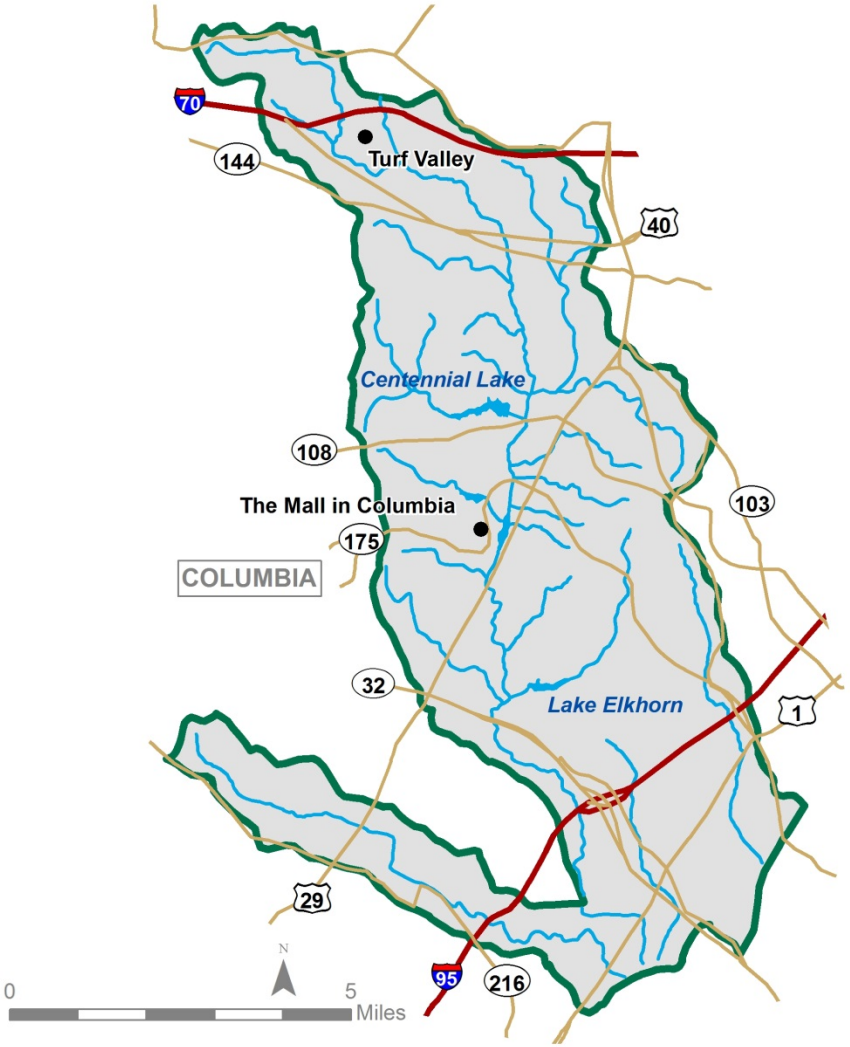


Watershed Characteristics

Little Patuxent River Watershed

Little Patuxent River

- 59 square miles
- 37,727 acres
- **9,688 impervious acres**
- 9,043 wooded acres
- 190 miles of streams
- **1,746 stormwater BMPs treating 47 acres of impervious**

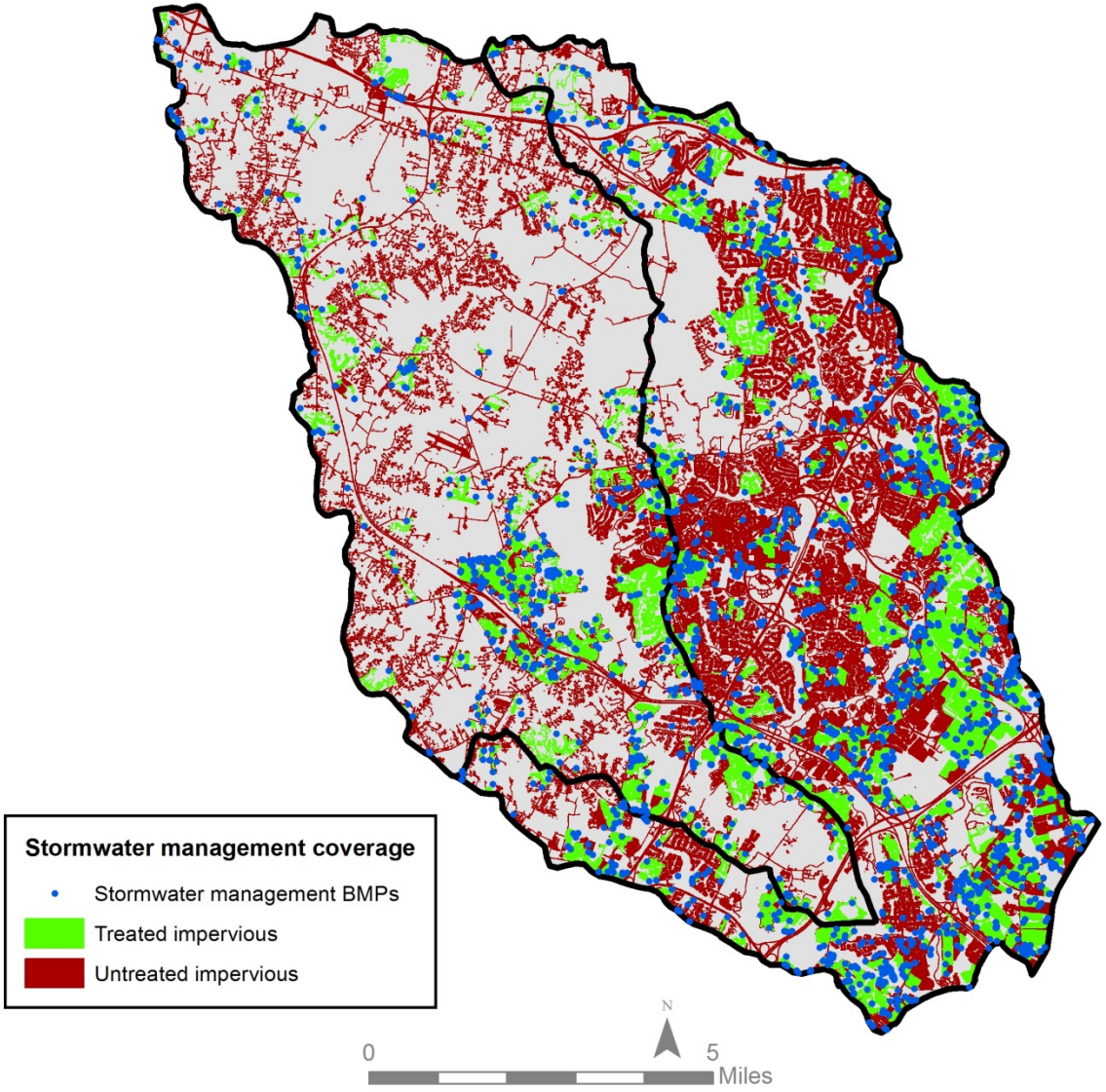


Middle Patuxent River Watershed

Middle Patuxent River

- 58 square miles
- 37,074 acres
- **3,675 impervious acres**
- 12,367 wooded acres
- 227 miles of streams
- **593 stormwater BMPs treating 40 acres of impervious**

Stormwater BMPs



Watershed Study – Phase 1

- Completed mid-July 2015
  - Desktop Analysis
  - Handheld Tablet Setup and Programming
  - Consultant Field Calibration and Training
  - Field Assessment (Approx. 3 months)
  - Review and Compile Field Data
  - Late June 2015 - Community Meetings - #1
  - Prepare Site Ranking and Prioritization

Project Types Investigated

- Retrofit of Existing BMPs
- New BMPs
- Outfall Stabilization
- Stream Restoration
- Reforestation/Riparian Buffers

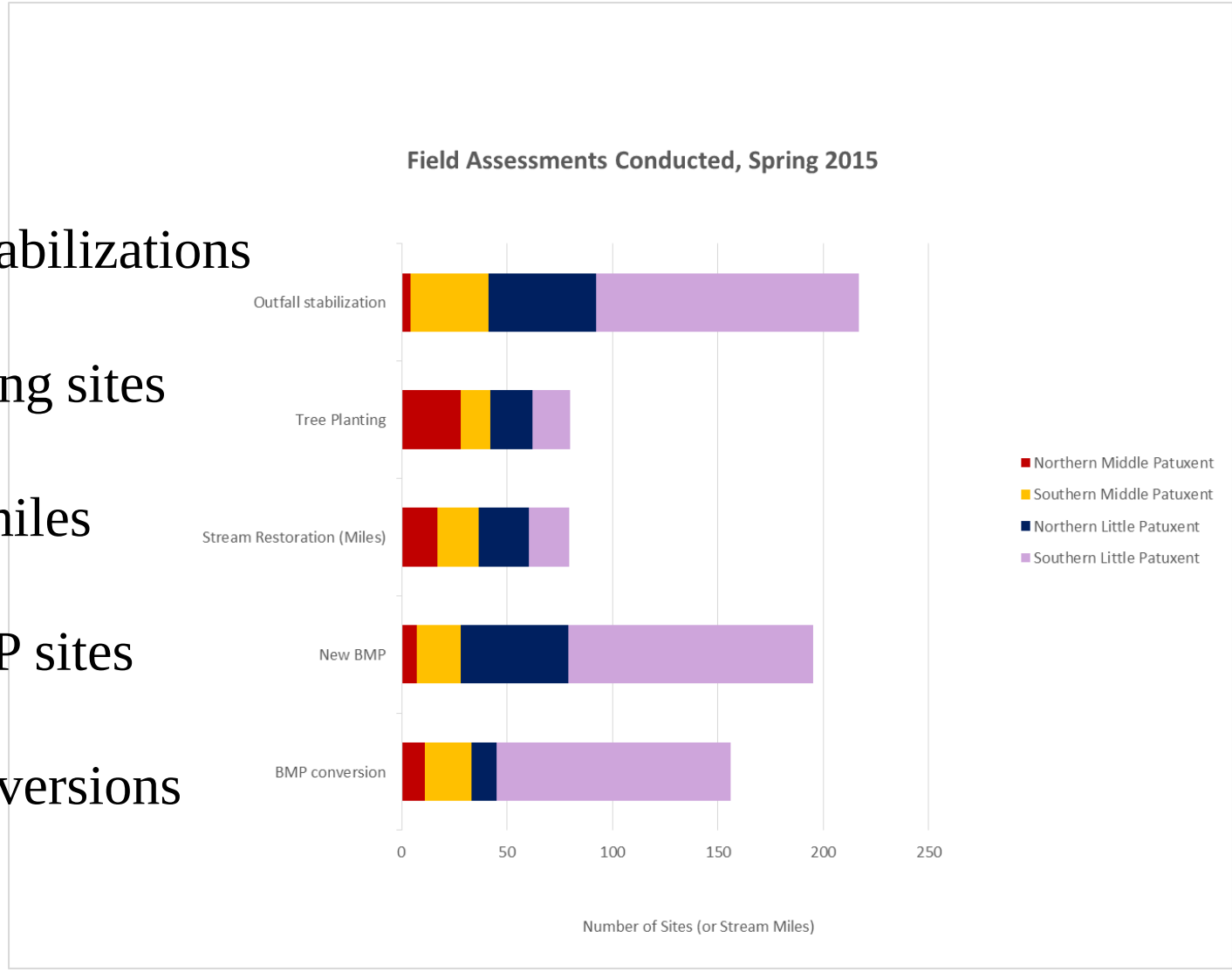
Field Assessments and Results

Field Assessment

Field Assessment Results – Total

Sites Assessed:

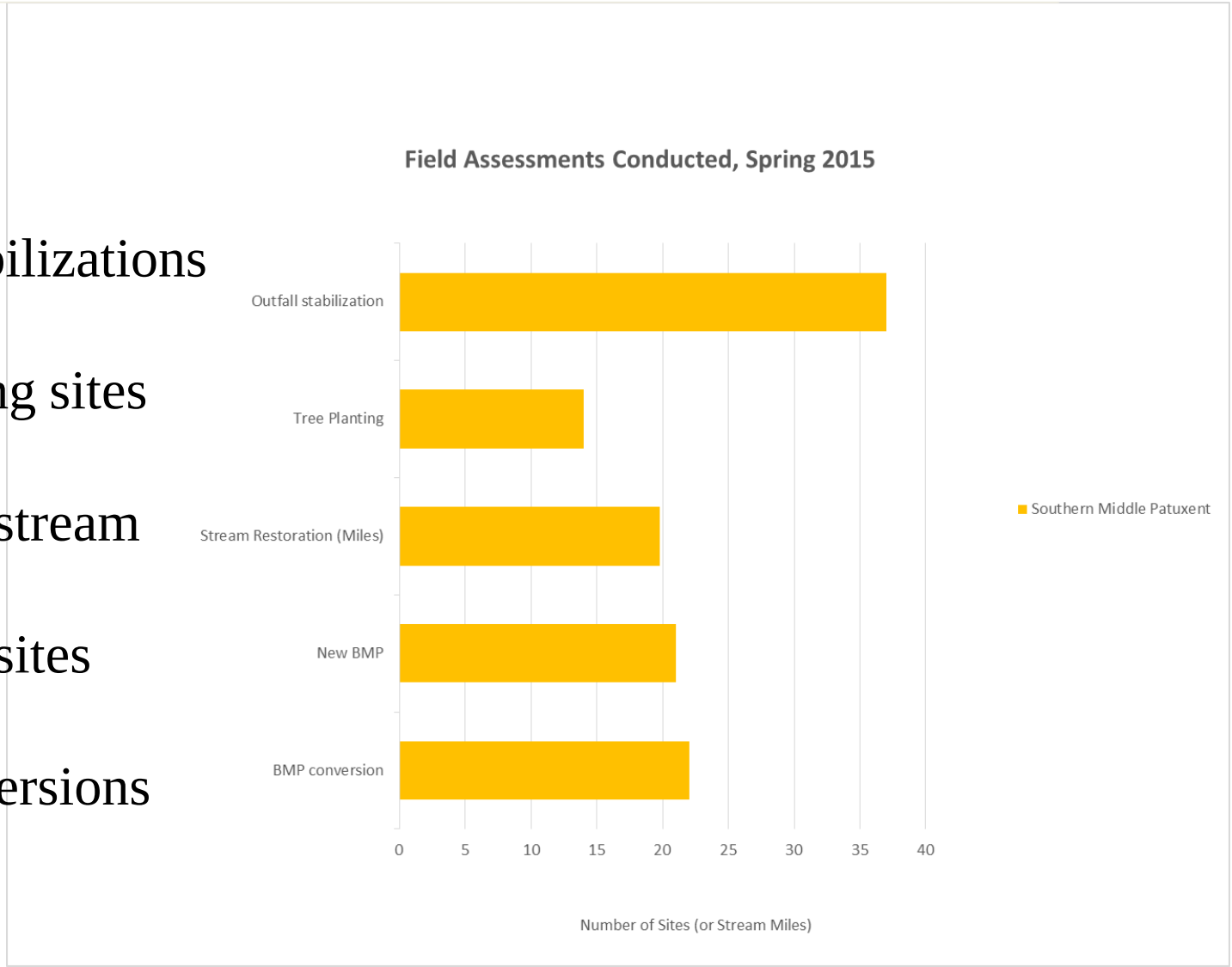
- 217 Outfall stabilizations
- 80 Tree planting sites
- 79.4 Stream miles
- 195 New BMP sites
- 156 BMP conversions



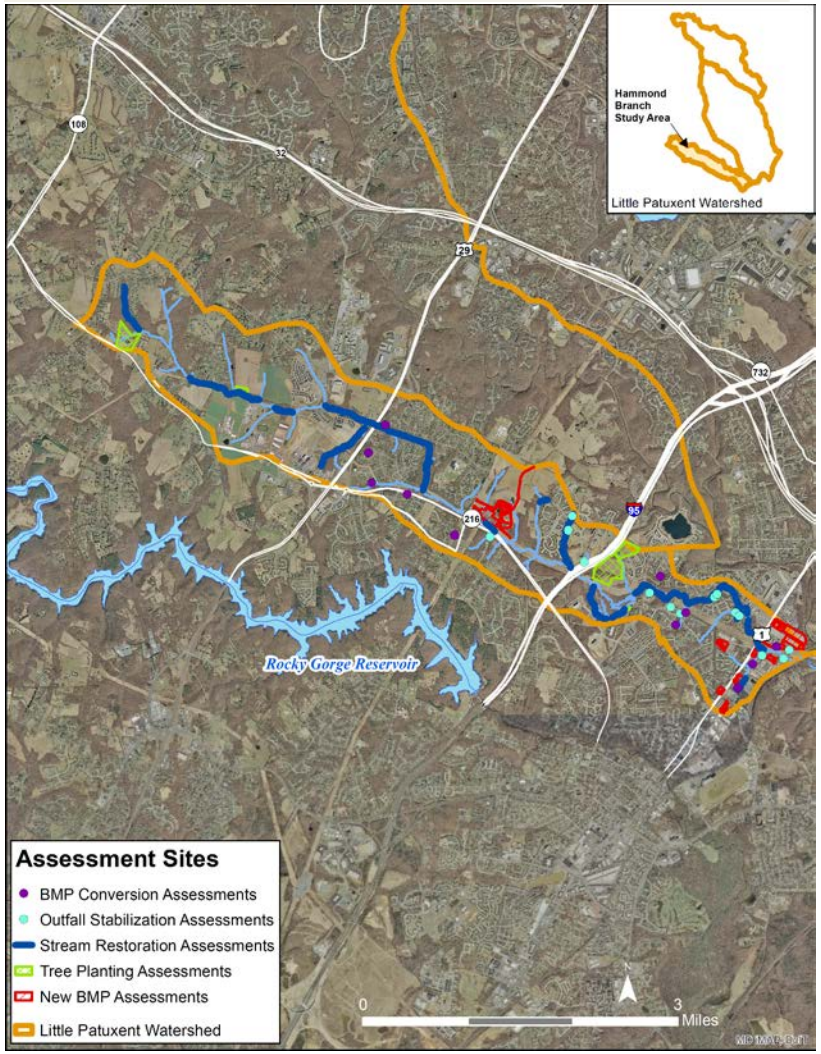
Field Assessment Results – SMP and Hammond Branch

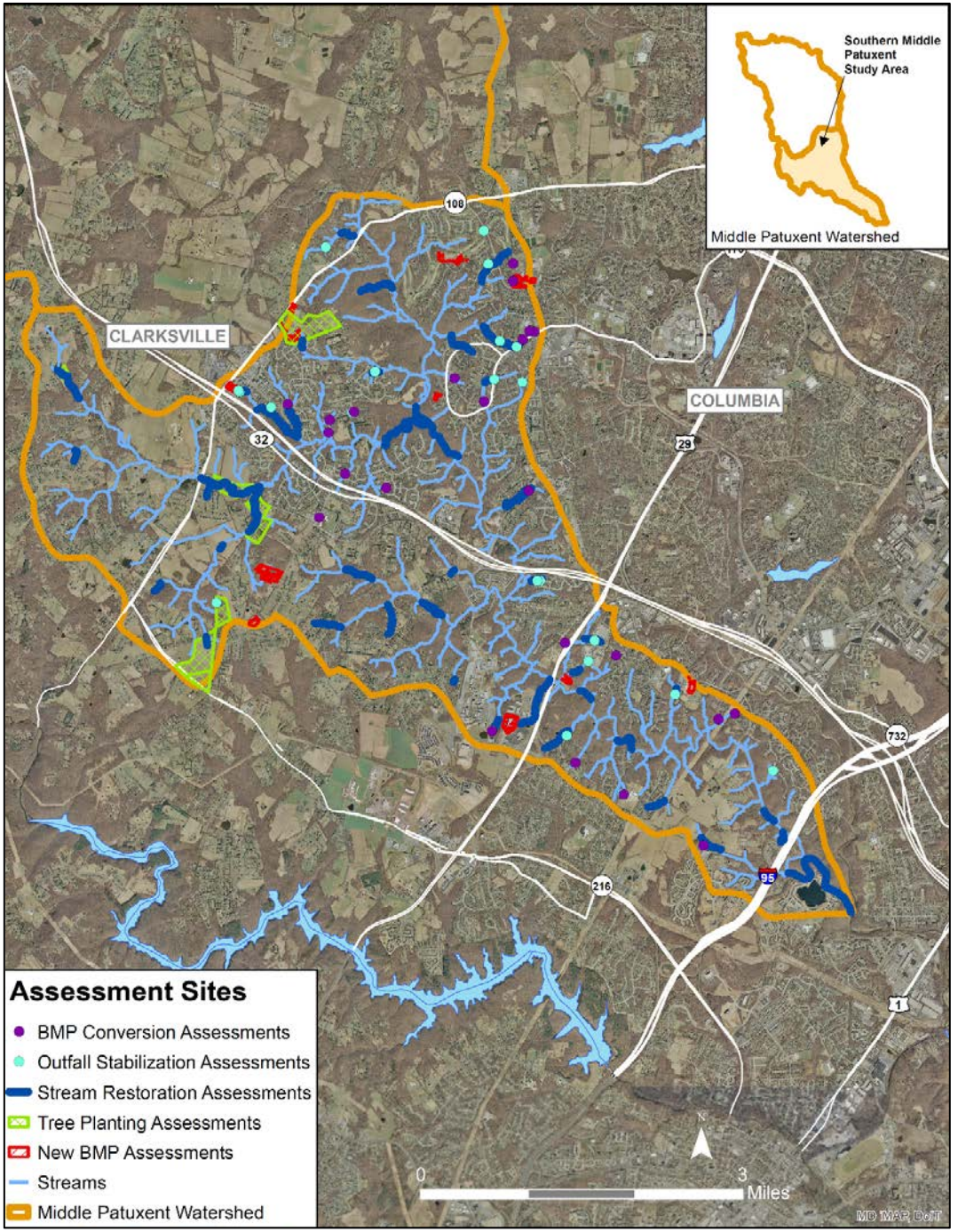
Sites Assessed:

- 37 outfall stabilizations
- 14 tree planting sites
- 19.8 miles of stream
- 21 new BMP sites
- 22 BMP conversions



Field Assessment Sites – SMP and Hammond Branch





Watershed Study – Phase II

- Scheduled completion end of 2015
  - Perform Concept Level Designs (Including Cost Estimates)
  - Rank sites ($/acre of impervious treated)
  - Input to restoration plan (CIS)
  - Generate Draft Watershed Report
  - **Community Meetings - #2**
  - Review and Comment Period
  - Report to MDE December 17, 2015

Site Ranking Factors

- Feasibility
  - Ease of access
  - Conflicts with infrastructure or other site constraints
  - Adverse impacts to nearby trees
  - Ownership – public vs. private
  - Pond/infrastructure already in need of repair
  - Field assessment – high potential for restoration/retrofit
  - Site preparation required before planting

- Biological uplift – additional benefits, such as augmenting existing green infrastructure or protecting wetlands
  - Within 500 feet of Green Infrastructure Network or High Quality (Tier II) waters
  - Planting is within 100 feet of wetlands

Site Ranking Factors

- Permit contribution – how project will help meet MS4 impervious treatment requirements and TMDL pollutant reduction goals
  - Acres of impervious treatment
  - Cost per acre of impervious treatment
  - Pollutant load reduction factor (Sum of % load reductions for TN, TP, and sediment)

- Programmatic benefit – value beyond primary functional purpose
  - Site has educational value and/or is visible for public demonstration
  - Site is near two or more other potential projects allowing for easier monitoring and demonstration of benefit

Site Ranking Factors

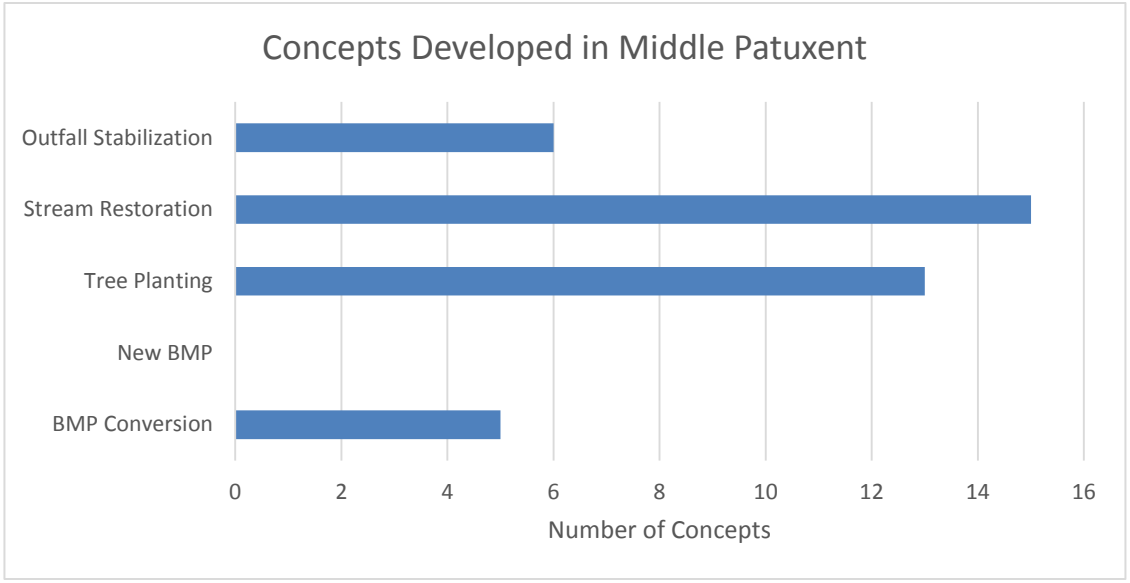
- Erosion factor (stream and outfall stabilization projects)
  - Length and severity of erosion

- Stream condition factors (stream projects)
  - Average Bank Erosion Hazard Index (BEHI) score
  - Habitat Assessment score
  - Number of other problems along reach (exposed pipes, pipe outfalls, unusual conditions, etc.)

Site Assessment – Scoring Results

Middle Patuxent Watershed

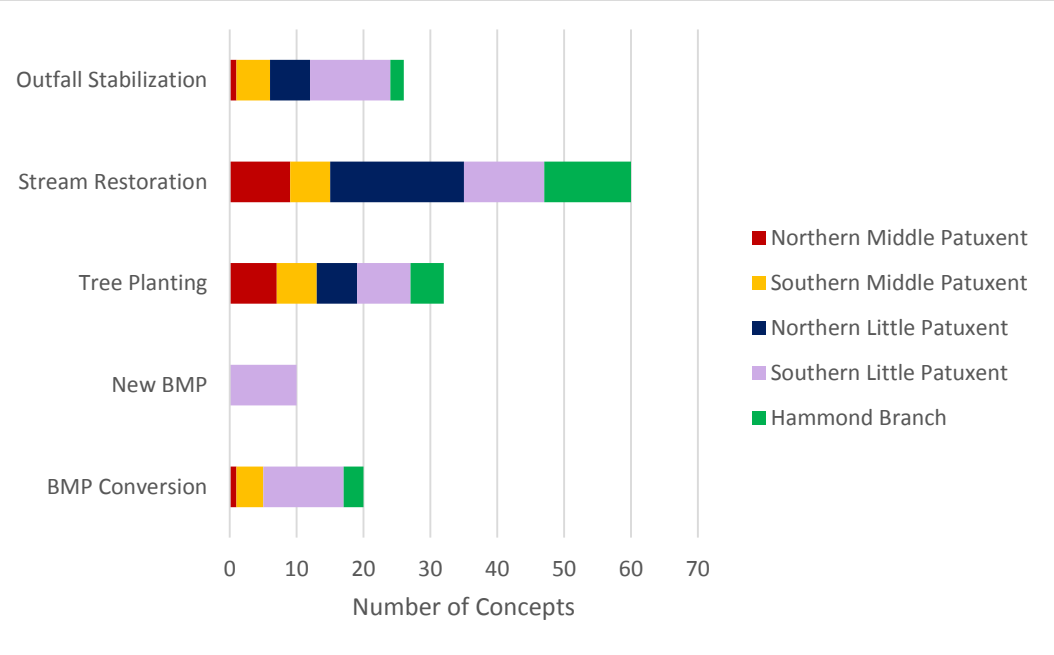
Type	Number of Concepts	Max Score	Min Score	Min Concept Score
BMP Conversion	5	32	11	26
New BMP	0	24	22	N/A
Tree Planting	13	32	22	26
Stream Restoration	15	31	19	25
Outfall Stabilization	6	28	18	26
Total	**39**	**32**	**11**	**25**



Concept Plans - Total

Concepts Prepared:

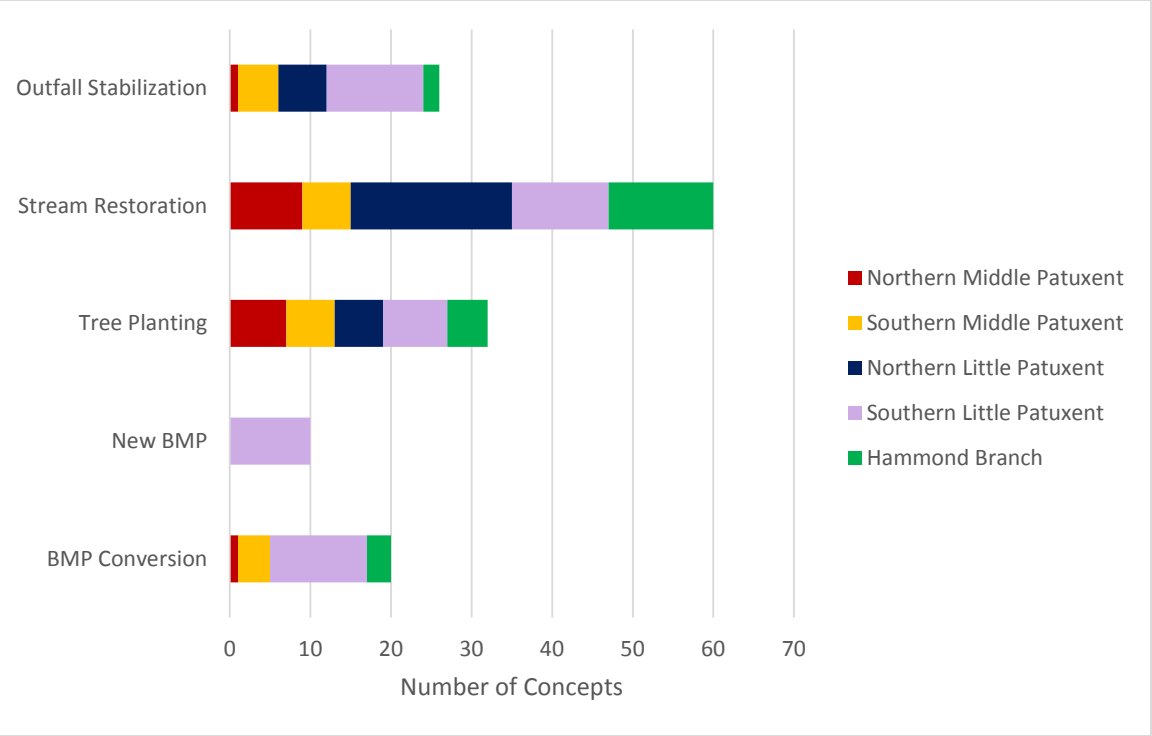
- 26 Outfall stabilizations
- 60 Stream restorations
- 32 Tree planting sites
- 10 New BMP sites
- 20 BMP conversions
- 148 Total



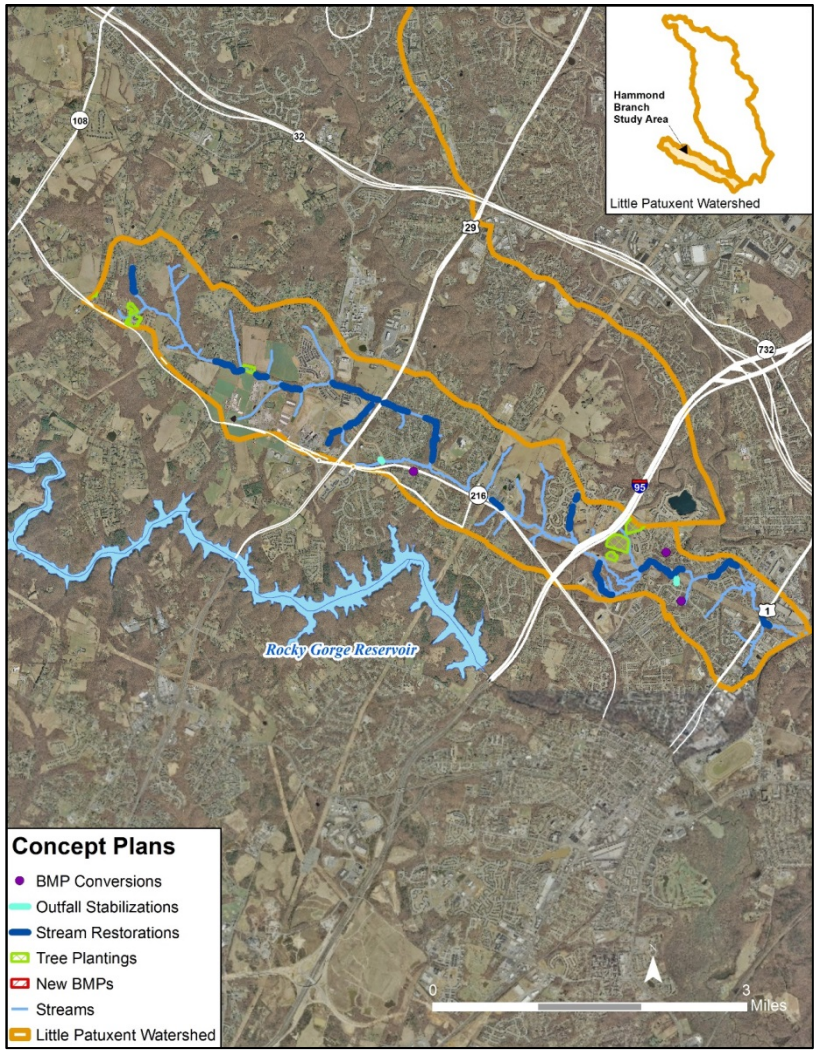
Concept Plans –SMP and Hammond Branch

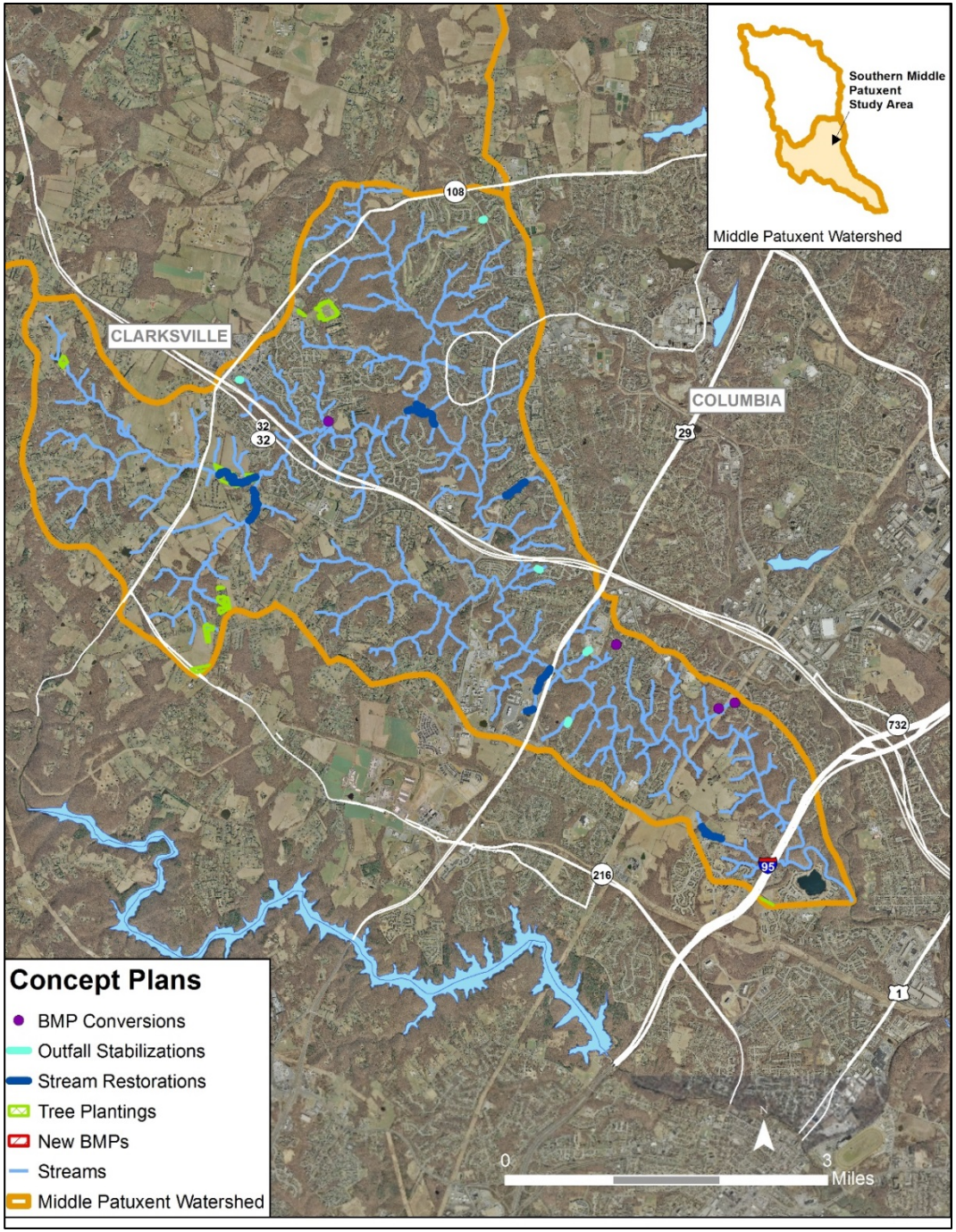
Concepts Prepared:

- 7 Outfall stabilization
- 19 Stream restorations
- 11 Tree planting sites
- 0 New BMP sites
- 7 BMP conversion
- <u>44 Total</u>



Concept Plan Sites – SMP and Hammond Branch





Concept Plan - Typical

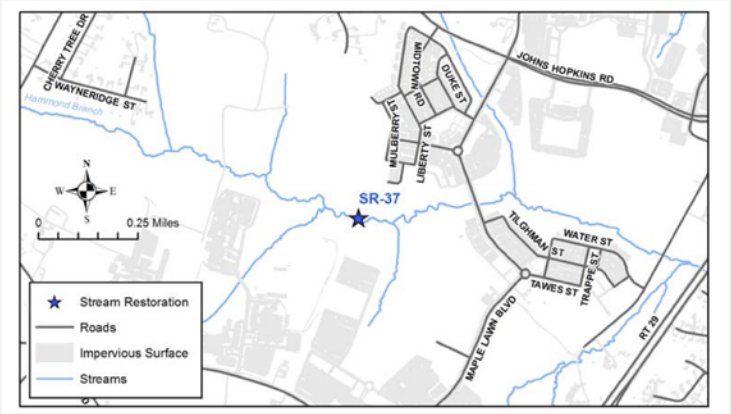
Howard County Watershed Assessment Concept Plan: Stream Restoration

Site ID: SR-37
Site Name: Hammond Branch (d) - Reservoir High School
Contractor: Biohabitats
Watershed: Little Patuxent River

Ownership: Private- Commercial/Industrial
Multiple Owners

Existing Conditions:

This project site includes two stream assessment sites: SMP-SR-F336A and SMP-SR-F338A. SMP-SR-F338A is upstream of SMP-SR-F336A on Hammond Branch. A BGE ROW runs the length of the site, with very little overhead cover and shade. SMP-SR-338A is located near Cedar Lane School and Lime Kiln Middle School, while SMP-SR-F336A is near Reservoir High School. The stream has moderate erosion occurring along both the left and right banks ranging from 3 to 5 ft. in bank height for most of the length. The upstream reach (SMP-SR-F338A) has a long section of eroding bank over 9 ft. in height, the right bank has very high eroding banks cutting into the hillslope near the school. The instream habitat within the existing channel scored in the marginal range overall. The epifaunal substrate upstream is poor with less than 20% stable habitat; however, as the stream moves downstream the epifaunal substrate becomes better and consists of 40-70% stable habitat favorable for epifaunal colonization with desirable habitat and some disturbed substrate not ready for colonization yet. Embeddedness throughout the stream is higher at the upstream end and continues to decrease as the stream moves downstream with an average of 25-50% of gravel, cobble, and boulder particles surrounded by fine sediment. The velocity/depth regime of the channel is suboptimal with three velocities present throughout the stream. Severe sediment deposition occurs within the upstream portion of the stream with 50% of the bottom affected and bar formations are occurring along the stream banks. As the stream moves downstream, only 30% of the bottom is affected by sediment deposition. The channel flow status is suboptimal throughout the stream with water filling on average 75% of the available channel and some riffle substrate exposed. Bank stability is moderately unstable on both the left and right side of the stream with 30-60% of the stream banks having some cover and increased erosion during floods. Vegetative protection along the left and right bank is marginal with an average of 70% of the stream bank surface covered. Shading along the existing channel is poor (10%).



Howard County Watershed Assessment Concept Plan: Stream Restoration

Site ID: SR-37
Site Name: Hammond Branch (d) - Reservoir High School
Contractor: Biohabitats
Watershed: Little Patuxent River

Facing downstream, an average 4 ft. recently eroded bank.

Facing downstream, very high eroded banks cutting into the hillslope near the school.

Howard County Watershed Assessment Concept Plan: Stream Restoration

Site ID: SR-37
Site Name: Hammond Branch (d) - Reservoir High School
Contractor: Biohabitats
Watershed: Little Patuxent River

Constraints/Utilities:

Both site assessments are mainly within a BGE ROW and are in close proximity to multiple schools. There are electrical power lines overhead and transmission poles along the stream that can make the site hazardous during construction. A sewer line does cross the stream and runs along a small portion of the stream. Very minimal tree impacts are anticipated due to a lack of overhead cover.

Concept Description:

The objective for this project is to reduce bank erosion and improve instream habitat for aquatic organisms. To improve instream habitat, either the stream invert can be raised or a new floodplain can be graded to reduce bank erosion and promote floodplain reconnection. In addition, grading banks back to a stable angle and stabilizing them with native vegetation to hold soil in place will help reduce bank erosion. Adding woody debris, cobble riffles, pools, and other nature-like habitat structures will reinforce the stream bed and banks, improve the flow diversity and structural complexity of the stream bed, and uplift the instream habitat. The proposed channel restoration work would occur predominately on the existing channel alignment; however, some minor realignment may be necessary where the stream is cutting into the hillslope. Maximizing riparian buffer will increase the shading to reduce the stream temperature and provide needed litter inputs and woody debris. This channel restoration has the potential to reduce the sediment supply, improve habitat, provide opportunities for nutrient uptake, and serve as an outdoor learning laboratory for the surrounding schools. The site can be accessed from the BGE access road and/or the nearby school. There are seven other nearby project recommendations that should be concurrently implemented with this site including five stream restoration sites and two tree planting site. These nearby projects include: SR-33, SR-34, SR-35, SR-36, SR-38, SMP-TP-F405A, and SMP-TP-F406. The outfalls from the area being developed on the reach between here and SR-38 should be modified so that the flow passes to the stream through a channel, not sheet flow so as to limit future headcutting up to the outfall.

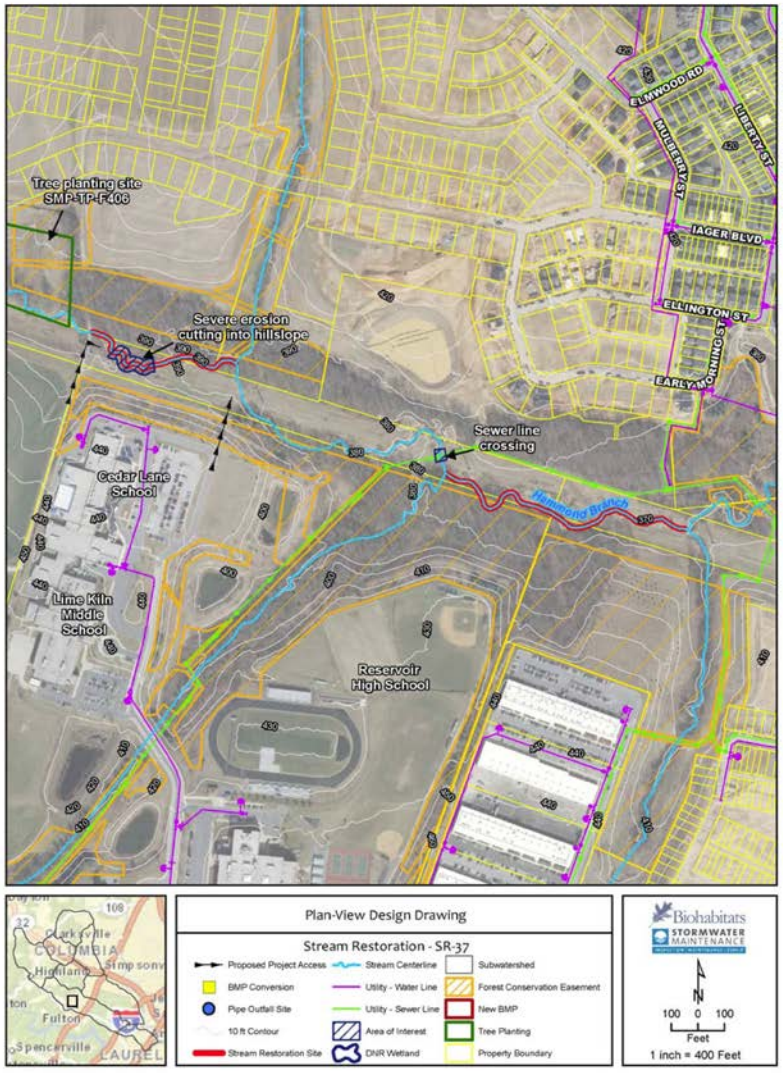
Nearby Opportunities:

SR-33, SR-34, SR-35, SR-36, SR-38, SMP-TP-F405A, SMP-TP-F406

Proposed Project Credit		Costs	
Length Restored (ft):	1,749	Estimated Design Cost:	$300,000.00
Impervious Area Treated Credit (ac.):	17.5	Estimated Construction Cost:	$787,500.00
Cost per Impervious Credit Acre:	$75,686.11	30% Contingency:	$236,250.00
		Estimated Total Cost:	$1,323,750.00

Howard County Watershed Assessment Concept Plan: Stream Restoration

Site ID: SR-37
Site Name: Hammond Branch (d) - Reservoir High School
Contractor: Biohabitats
Watershed: Little Patuxent River



Modeling Results

Number of Concepts

Number of Projects by Project Type and Watershed			
	Little Patuxent River	Middle Patuxent River	*Grand Total*
BMP Conversions	15	5	*20*
New BMPs	10	0	*10*
Outfall Stabilization	20	6	*26*
Stream Restorations	45	15	*60*
Tree Plantings	19	13	*32*
Grand Total	*109*	*39*	*148*

Impervious Acre Credit - Concepts

Total Impervious Credit Acres by Project Type and Watershed			
	Little Patuxent River	Middle Patuxent River	*Grand Total*
BMP Conversion	81.78	19.37	*101.15*
New BMP	33.47	-	*33.47*
Outfall	49.84	22.29	*72.13*
Stream Restoration	868.91	337.58	*1,206.49*
Tree Planting	33.67	31.78	*65.45*
Grand Total	*1,067.67*	*411.02*	*1,478.69*

Nitrogen Reduction - Concepts

Target Reduction – Approx. 12%

Total Nitrogen Reduction (lbs/yr) by Project Type and Watershed					
	Little Patuxent River	% Reduction of Total Urban	Middle Patuxent River	% Reduction of Total Urban	*Grand Total*
BMP Conversion	516.8	0.18%	141.7	0.08%	*658.5*
New BMP	138.6	0.05%	-	0.00%	*138.6*
Outfall (SPSC only)	252.4	0.09%	77.7	0.04%	*330.0*
Stream Restoration	6,516.8	2.28%	2,532.0	1.39%	*9,048.8*
Tree Planting	570.2	0.20%	539.2	0.30%	*1,109.5*
Grand Total	*7,994.7*	2.80%	*3,290.6*	1.81%	*11,285.4*

Phosphorus Reduction - Concepts

Target Reduction – Approx. 20%

Total Phosphorus Reduction (lbs/yr) by Project Type and Watershed					
	Little Patuxent River	% Reduction of Total Urban	Middle Patuxent River	% Reduction of Total Urban	*Grand Total*
BMP Conversion	64.48	0.31%	10.64	0.11%	*75.11*
New BMP	35.56	0.17%	-	0.00%	*35.56*
Outfall (SPSC only)	37.25	0.18%	11.77	0.12%	*49.02*
Stream Restoration	5,908.52	28.62%	2,295.68	23.10%	*8,204.20*
Tree Planting	18.93	0.09%	17.90	0.18%	*36.82*
Grand Total	*6,064.73*	29.38%	*2,335.99*	23.50%	*8,400.72*

Sediment Reductions - Concepts

Sediment goal met if TP goal met

Sediment Reduction (lbs/yr) by Project Type and Watershed					
	Little Patuxent River	% Reduction of Total Urban	Middle Patuxent River	% Reduction of Total Urban	*Grand Total*
BMP Conversion	109,736	0.53%	45,050	0.34%	*154,786*
New BMP	47,395	0.23%	-	0.00%	*47,395*
Outfall (SPSC only)	39,961	0.19%	18,602	0.14%	*58,563*
Stream Restoration	3,899,623	18.81%	1,515,150	11.33%	*5,414,773*
Tree Planting	8,121	0.04%	6,072	0.05%	*14,193*
Grand Total	*4,104,836*	19.80%	*1,584,874*	11.85%	*5,689,710*

Estimated Costs - Concepts

Total Cost by Project Type and Watershed			
	Little Patuxent River	Middle Patuxent River	*Grand Total*
BMP Conversion	$ 4,607,177	$ 1,768,062	*$ 6,375,239*
New BMP	$ 4,150,497	$ -	*$ 4,150,497*
Outfall	$ 4,837,128	$ 1,735,222	*$ 6,572,350*
Stream Restoration	$ 63,882,088	$ 24,151,355	*$ 88,033,443*
Tree Planting	$ 3,874,096	$ 3,614,000	*$ 7,488,096*
Grand Total	*$ 81,350,985*	*$ 31,268,639*	*$ 112,619,625*

Watershed Assessment Summary:

- Confirmed large number of restoration opportunities
- More need/potential projects in Little Patuxent than Middle Patuxent Watershed
- Streams – scored higher, more cost efficient, and plentiful
- Approx. 75% of projects on private property
- 148 projects will make a big dent in our permit requirements . . . and our checkbook

Watershed Study - Next Steps

- Master list for developing annual Capital Budget requests
- Help define total budget and manpower needs to meet permit conditions
- Input to CIS restoration plan
- Private property approach needed
- Public review and submittal to MDE
- Provide lessons learned for next watershed study – Patapsco River and Patuxent River

Can’t wait for restoration projects . . .

Restoration Toolbox

Bioretention

Pond Retrofit Project

Pond Retrofit Project

Outfall Stabilization

Stream Restoration

Riparian Buffer Enhancement

Alternative BMPs

Can we get credit from MDE?

Countywide Implementation Strategy (CIS)

Countywide Implementation Strategy (CIS) - Overview

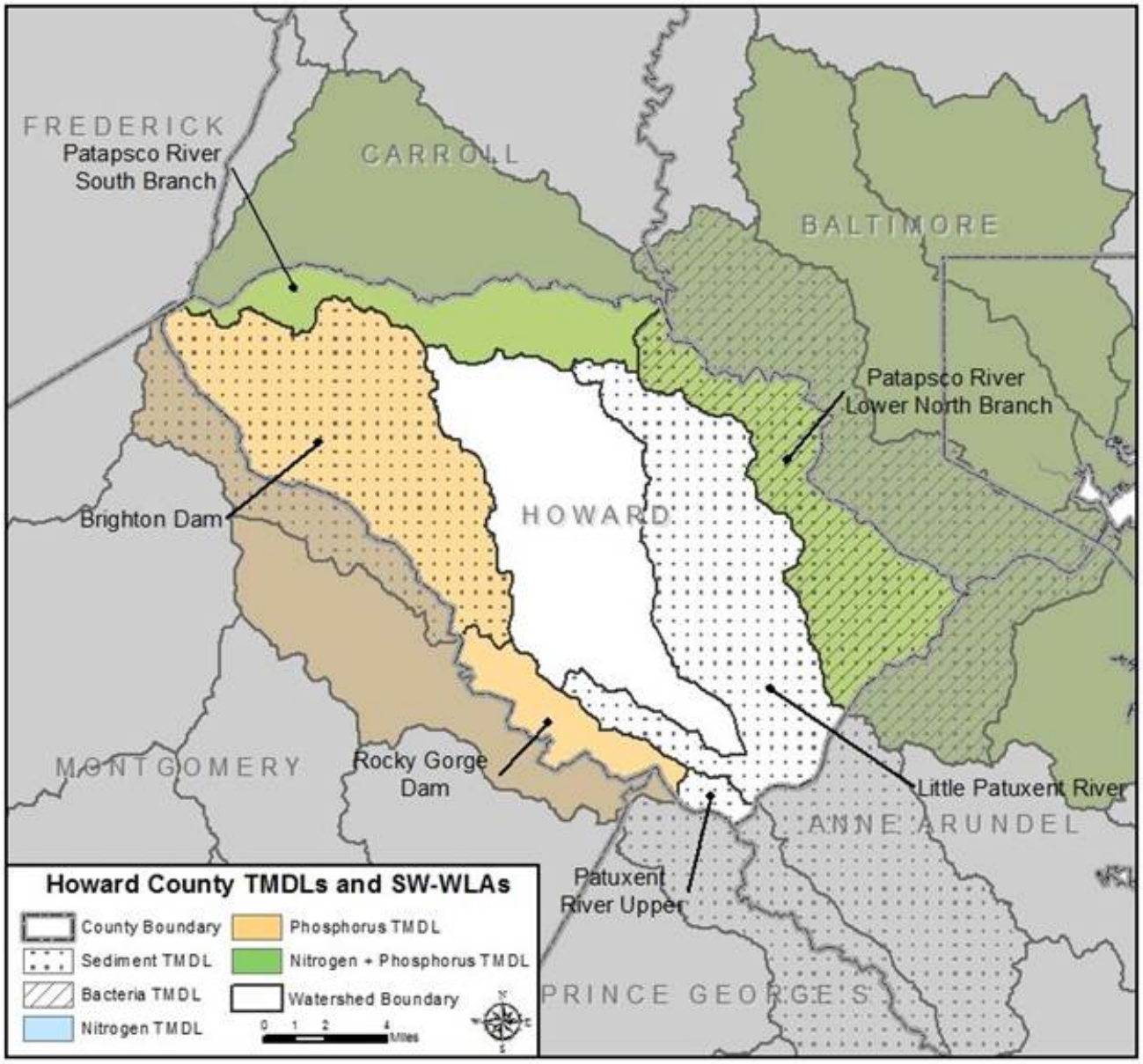
- It's our Restoration Plan
- Blue print for NPDES MS4 permit compliance, meeting TMDLs, and environmental improvements
- 30-day public review period
- Submittal to MDE December 17, 2015
- Review annually (adaptive management)
- Consists of nine chapters

Countywide Implementation Strategy (CIS)

Chapter 1 – Background and Purpose

- NPDES MS4 Permit requirement
- **Chesapeake Bay TMDL and Local TMDLs**
- **Middle Patuxent – no local TMDLs**
- **Impervious baseline determination**
- Impervious area treatment – 20% of non-MEP
- Summary of previous studies

Howard County TMDL Watersheds



Howard County Local TMDLs

Watershed	Impairment
Patapsco - Lower North Branch	Sediment, Bacteria
Baltimore Harbor	Nitrogen, Phosphorus
Little Patuxent	Sediment
Patuxent – Upper	Sediment
Triadelphia Reservoir (Brighton Dam)	Sediment
Rocky Gorge Reservoir	Phosphorus

Impervious Area Baseline

	Brighton Dam	Little Patuxent River	Middle Patuxent River	Patapsco River L N Br	Patuxent River Upper	Rocky Gorge Dam	South Branch Patapsco	Countywide
Impervious Baseline and Target (Impervious Credit Acres)								
Total Impervious Area	**1,830.1**	**9,139.7**	**3,410.9**	**4,424.8**	**439.7**	**584.8**	**744.3**	**20,574.5**
County MS4 Impervious Area	**1,691.1**	**8,124.7**	**2,990.6**	**3,854.5**	**381.0**	**530.9**	**629.9**	**18,202.8**
Pre-1985 Stormwater BMPs	2.4	112.4	34.2	15.1	0.0	0.4	0.0	164.4
New Development	*2.4*	*38.2*	*8.0*	*5.4*	*0.0*	*0.4*	*0.0*	*54.2*
Redevelopment	*0.0*	*74.3*	*26.2*	*9.7*	*0.0*	*0.0*	*0.0*	*110.2*
Restoration	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
1985 - 2002 Stormwater BMPs	50.7	743.1	222.9	465.8	67.0	20.6	7.6	1,577.6
New Development	*18.6*	*520.8*	*179.6*	*386.5*	*66.2*	*19.6*	*6.2*	*1,197.5*
Redevelopment	*23.8*	*208.4*	*23.5*	*65.7*	*0.8*	*0.6*	*0.0*	*322.8*
Restoration	*8.3*	*13.8*	*19.8*	*13.6*	*0.0*	*0.4*	*1.3*	*57.3*
2002 - 2013 Stormwater BMPs	230.0	1,613.3	572.7	909.6	72.7	79.5	56.6	3,534.2
New Development	*87.8*	*1,080.9*	*332.8*	*703.8*	*71.7*	*66.0*	*13.0*	*2,356.0*
Redevelopment	*20.0*	*289.8*	*53.0*	*139.0*	*0.1*	*1.1*	*5.0*	*508.0*
Restoration before 7/1/2013	*122.1*	*242.5*	*186.9*	*66.8*	*1.0*	*12.3*	*38.6*	*670.2*
Howard County Lakes	0.0	1,450.2	24.6	152.2	0.0	0.0	0.0	1,627.0
Rooftop Disconnect	55.7	163.5	64.7	44.7	5.5	12.9	20.7	367.5
Non-Rooftop Disconnect	176.2	147.8	168.5	88.6	7.8	42.7	75.7	707.3
Rain Barrels	0.1	0.5	0.1	0.2	0.0	0.0	0.0	0.9
Septic Upgrades	0.0	0.5	0.8	0.0	0.0	0.0	0.8	2.1
Impervious Baseline Treated	**515.0**	**4,231.2**	**1,088.4**	**1,676.1**	**153.1**	**156.0**	**161.3**	**7,981.1**
Impervious Baseline Untreated	**1,176.1**	**3,893.5**	**1,902.2**	**2,178.3**	**227.9**	**374.9**	**468.6**	**10,221.6**
20% Restoration Target	**235.2**	**778.7**	**380.4**	**435.7**	**45.6**	**75.0**	**93.7**	**2,044.3**

Countywide Implementation Strategy (CIS)

Chapter 2 – Causes and Sources of Impairment

- Biological impairments
- Nutrients, sediment, bacteria
- Land use/Land cover
- **Impervious areas**
- Anticipated growth

Countywide Implementation Strategy (CIS)

Watershed	Impervious	
	Acres	Percent
South Br. Patapsco	744	4.6
Patapsco - Lower North Br.	4,425	18.3
Middle Patuxent	3,411	9.2
Little Patuxent	9,140	24.0
Patuxent – Upper	440	25.5
Triadelphia Reservoir (Brighton Dam)	1,830	5.0
Rocky Gorge Reservoir	585	7.3

Countywide Implementation Strategy (CIS)

Chapter 3 – Management Measures

- Watershed assessments (current/future)
- **Summarizes Little/Middle Patuxent; projections for Patapsco/Patuxent**
- Modeling approach (MAST – **M**aryland **A**ssessment **S**cenario **T**ool & BayFAST)
- BMPs – types and efficiencies for pollutant removal

Countywide Implementation Strategy (CIS)

Chapter 4 – Load Reductions/Impervious Treated

- Summaries based on Actual Implementation and Planned Implementation
- Bay TMDL and Local TMDLs
- By BMP types and subwatershed
- **Compare results to goals**

Local TMDL Goals

	Baltimore Harbor		Little Patuxent	Patapsco R LN Branch		Patuxent R Upper	Rocky Gorge Reservoir	Triadelphia Reservoir (Brighton Dam)
	TN-EOS lbs/yr	TP-EOS lbs/yr	TSS-EOS lbs/yr	TSS-EOS lbs/yr	Bacteria MPN/100mL/ yr	TSS-EOS lbs/yr	TP-EOS lbs/yr	TP-EOS lbs/yr
Baseline Loads and Target Reductions								
TMDL Baseline Year	1995	1995	2005	2005	2005	2005	2000	2000
Calibrated Baseline Load	107,059	6,546	10,346,821	6,123,442	60,282	145,902	861	2,654
Target Percent Reduction	15.0%	15.0%	48.1%	10.0%	13.4%	11.4%	15.0%	15.0%
Calibrated Target Reduction	16,059	982	4,976,821	612,344	8,078	16,633	129	398
Calibrated TMDL WLA	91,000	5,564	5,370,000	5,511,098	52,204	129,269	732	2,256
2015 Progress Reductions								
Restoration Reductions (from baseline to 2015)	2,324	205	697,379	99,887	4,975	4,477	64	112
Planned Reductions								
Planned Reductions	14,020	5,184	4,325,445	2,841,452	5,862	45,244	137	410
2016 Concepts (Pending)	*13,526*	*4,913*	*1,124,634*	*2,633,671*	*5,513*	*45,244*	*137*	*410*
FY16/17 Planned + 2015 Concepts	*494*	*271*	*3,200,810*	*207,781*	*349*	*0*	*0*	*0*
Restoration Reduction Percent	13.1%	79.2%	41.8%	46.4%	9.7%	31.0%	15.9%	15.5%
Totals								
Reduction (Progress+Planned)	16,344	5,389	5,022,824	2,941,339	10,837	49,721	201	522
Reduction Percent (Progress + Planned)	15.3%	82.3%	48.5%	48.0%	18.0%	34.1%	23.3%	19.7%
Reduction Remaining for Treatment	-285	-4,407	-46,003	-2,328,995	-2,759	-33,088	-72	-124

Bay TMDL Goals

	TN-EOS lbs/yr	TN-DEL lbs/yr	TP-EOS lbs/yr	TP-DEL lbs/yr	TSS-EOS lbs/yr	TSS-DEL lbs/yr
Baseline and Targets						
Calibrated 2010 Baseline Load	566,350	319,997	27,609	14,300	26,344,338	20,262,457
Target Percent Reduction	11.98%	12.00%	20.72%	19.74%	-	-
Calibrated Target Reduction	67,849	38,400	5,721	2,823	-	-
Calibrated Bay TMDL WLA	498,501	281,597	21,889	11,477	-	-
2015 Progress Reductions						
Restoration Reductions (from baseline to 2015)	4,950	2,115	1,353	893	843,467	808,062
Planned Reductions (2016 – 2025)						
Planned Reductions	32,333	20,956	18,048	11,338	12,759,062	11,695,030
2016 Concepts (Pending)	*18,314*	*10,589*	*8,962*	*4,723*	*6,475,206*	*5,060,663*
FY16/17 Planned + 2015 Concepts	*14,018*	*10,367*	*9,086*	*6,615*	*6,283,856*	*6,634,367*
Planned Reduction Percent	5.7%	6.5%	65.4%	79.3%	48.4%	57.7%
Total Reductions						
Reduction (Progress + Planned)	37,283	23,071	19,400	12,231	13,602,529	12,503,092
Reduction Percent (Progress + Planned)	6.6%	7.2%	70.3%	85.5%	51.6%	61.7%
Reduction Remaining for Treatment	30,566	15,328	-13,680	-9,408	-	-
Reduction Percent Remaining	5.4%	4.8%	-49.5%	-65.8%	-	-

20% Impervious Acre Goal

	Brighton Dam	Little Patuxent River	Middle Patuxent River	Patapsco River L N Br	Patuxent River upper	Rocky Gorge Dam	S Branch Patapsco	Countywide
Impervious Baseline and Target (Impervious Credit Acres)								
County MS4 Impervious Area	**1,691.1**	**8,124.7**	**2,990.6**	**3,854.5**	**381.0**	**530.9**	**629.9**	**18,202.8**
Impervious Baseline Treated	**515.0**	**4,231.2**	**1,088.4**	**1,676.1**	**153.1**	**156.0**	**161.3**	**7,981.1**
Impervious Baseline Untreated	**1,176.1**	**3,893.5**	**1,902.2**	**2,178.3**	**227.9**	**374.9**	**468.6**	**10,221.6**
20% Restoration Target	**235.2**	**778.7**	**380.4**	**435.7**	**45.6**	**75.0**	**93.7**	**2,044.3**
2015 Progress Impervious Restoration (Impervious Credit Acres)								
2015 Total Progress Restoration	**35.2**	**72.0**	**28.2**	**11.8**	**0.0**	**3.6**	**6.5**	**157.4**
% Impervious Treated	**3.0%**	**1.8%**	**1.5%**	**0.5%**	**0.0%**	**1.0%**	**1.4%**	**1.5%**
Planned Impervious Restoration (2016-2019) (Impervious Credit Acres)								
Total Restoration BMPs	60.3	926.8	330.9	247.9	10.1	29.0	51.6	1,656.6
2016 Concepts (Pending)	*60.3*	*106.2*		*201.1*	*10.1*	*20.1*	*51.6*	*449.5*
FY16/FY17 Planned and 2015 Concepts		*820.6*	*330.9*	*46.8*		*8.9*		*1,207.1*
Rain Barrels	0.04	0.30	0.09	0.13	0.01	0.02	0.61	1.2
Septic Pump-outs	38.6	38.6	38.6	38.6	38.6	38.6	38.6	270.0
Septic Upgrades	4.5	4.5	4.5	4.5	4.5	4.5	4.5	31.2
Total Planned Impervious Restoration	**103.4**	**970.2**	**374.0**	**291.0**	**53.1**	**72.1**	**95.3**	**1,959.0**
% Impervious Treated	**8.8%**	**24.9%**	**19.7%**	**13.4%**	**23.3%**	**19.2%**	**20.3%**	**19.2%**
Total Impervious Restoration to 2019 (Impervious Credit Acres)								
2015 Progress	**35.2**	**72.0**	**28.2**	**11.8**	**0.0**	**3.6**	**6.5**	**157.4**
2016-2019 Planned	**103.4**	**970.2**	**374.0**	**291.0**	**53.1**	**72.1**	**95.3**	**1,959.0**
Total Impervious Restoration	**138.6**	**1,042.1**	**402.2**	**302.9**	**53.1**	**75.7**	**101.8**	**2,116.4**
% Impervious Treated	**11.8%**	**26.8%**	**21.1%**	**13.9%**	**23.3%**	**20.2%**	**21.7%**	**20.7%**

Countywide Implementation Strategy (CIS)

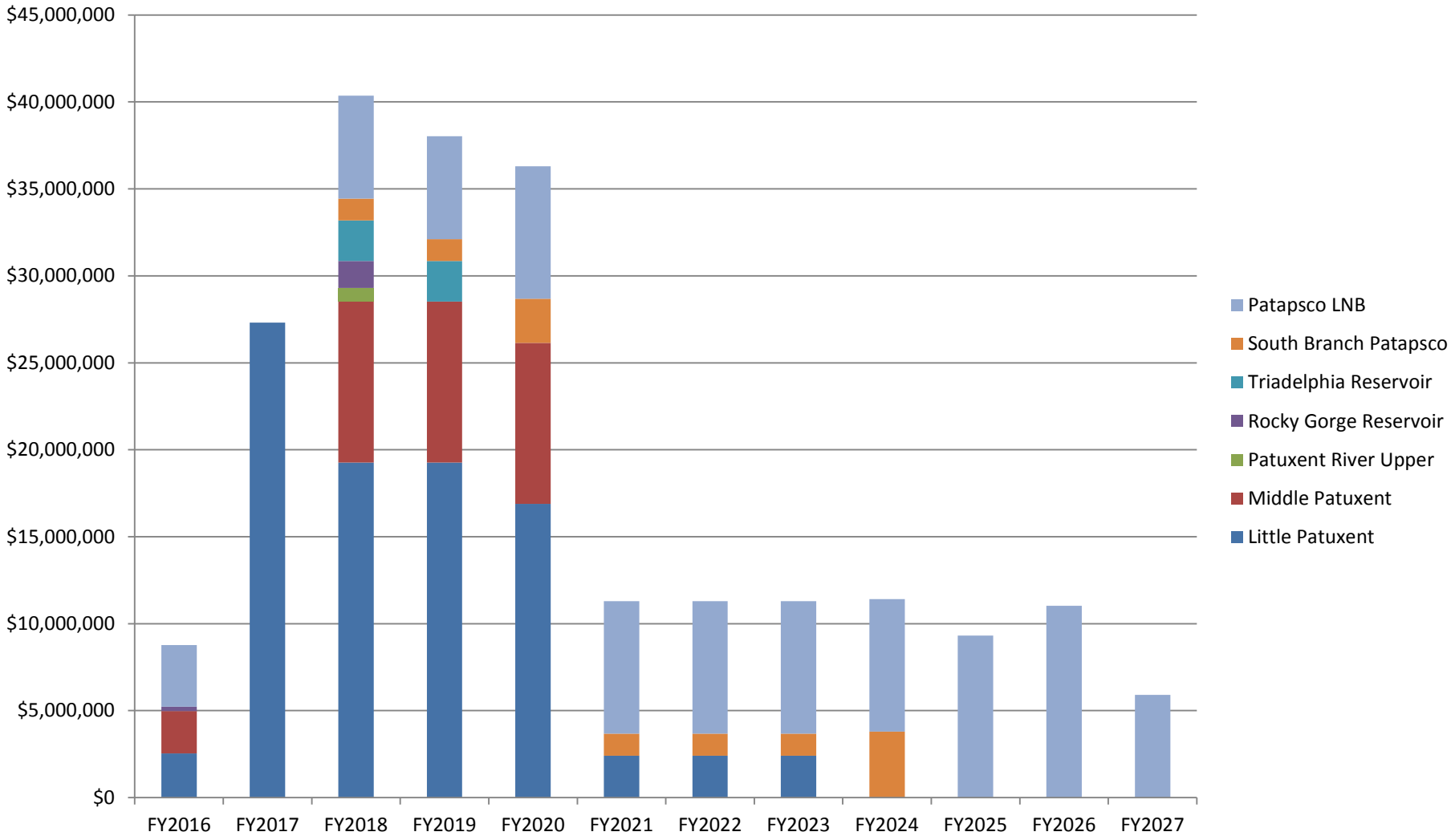
Chapter 5 – Technical/Financial Assistance Needs

- Technical assistance
- **Implementation cost summary**
- Funding sources

Cost Summary **Estimate**

						Baltimore Harbor		
Fiscal Year	**Little Patuxent**	**Middle Patuxent**	**Patuxent River Upper**	**Rocky Gorge Reservoir**	**Triadelphia Reservoir**	**South Branch Patapsco**	**Patapsco LNB**	**Total**
2016	$ 2,536,484	$ 2,443,236		$ 250,000			$ 3,535,768	**$ 8,765,487**
2017	$ 27,305,179							**$ 27,305,179**
2018	$ 19,263,884	$ 9,254,620	$ 777,212	$ 1,554,424	$ 2,331,636	$ 1,263,190	$ 5,912,839	**$ 40,357,805**
2019	$ 19,263,884	$ 9,254,620			$ 2,331,636	$ 1,263,190	$ 5,912,839	**$ 38,026,169**
2020	$ 16,894,849	$ 9,254,620				$ 2,526,379	$ 7,616,545	**$ 36,292,393**
2021	$ 2,413,550					$ 1,263,190	$ 7,616,545	**$ 11,293,285**
2022	$ 2,413,550					$ 1,263,190	$ 7,616,545	**$ 11,293,285**
2023	$ 2,413,550					$ 1,263,190	$ 7,616,545	**$ 11,293,285**
2024						$ 3,789,569	$ 7,616,545	**$ 11,406,114**
2025							$ 9,320,252	**$ 9,320,252**
2026							$ 11,023,958	**$ 11,023,958**
2027							$ 5,912,839	**$ 5,912,839**
Total	**$ 92,504,931**	**$ 30,207,095**	**$ 777,212**	**$ 1,804,424**	**$ 4,663,272**	**$ 12,631,896**	**$ 79,701,223**	**$ 222,290,052**

Cost Summary Estimate



Countywide Implementation Strategy (CIS)

Chapter 6 – Public Participation/Education

- Lists current environmental outreach
- This meeting is part of Public Outreach
- **30-day public review/comment period**

Countywide Implementation Strategy (CIS)

Chapter 7 – Implementation Schedule

- Lists various milestones
- **Provides possible schedule for attaining goals**

Goals met?

Based on all projections and assumptions in CIS:

- 20% impervious acres – MS4 permit condition met by end of 2019
- Local TMDLs – known TMDLs met by 2027 (some earlier)
- Bay TMDL (Urban Stormwater Sector)
  - By the numbers: TP, TSS met; TN partially met by 2025
  - By MS4 permit – all met if achieve 20% impervious treatment goal

Countywide Implementation Strategy (CIS)

Chapter 8 – Load Reduction Evaluation Criteria

- 2-year interim milestone reporting (State)
- Annual NPDES reporting
- Triennial BMP inspections
- **Regular evaluation and adaptive management**

Countywide Implementation Strategy (CIS)

Chapter 9 – Monitoring

- Current monitoring – biological, chemical, physical (NPDES permit condition and voluntary)
- Stormwater Design Manual (NPDES permit condition)

Countywide Implementation Strategy (CIS)

In Summary:

- Comprehensive summary of County's current and proposed efforts for environmental restoration and permit compliance
- **Planning document** including possible schedule and estimated anticipated costs

Want to learn more about stormwater?

Office of Community Sustainability

www.cleanwaterhoward.com

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Howard County Stormwater Solutions

Stormwater Management Division Website

www.howardcountymd.gov/SWM.htm

- Meeting #1 and #2 Powerpoint
- Watershed Assessment Reports
  (Little Patuxent and Middle Patuxent)
- CIS Report

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